

**Exhibit 1**

## **Owner's Operator and Maintenance Manual**

**3G Storm Series<sup>®</sup>**  
**Wheelchairs**  
**Arrow<sup>®</sup> RWD**  
**Torque<sup>™</sup> SP RWD**  
**Ranger X<sup>™</sup> RWD**  
*including*  
**Power Tilt Only**  
**Elevating Seat Only**  
**Power Tilt and Elevating Seat**  
**2G Tarsys<sup>®</sup>**  
**(2GT<sup>™</sup> - Tilt, 2GR<sup>™</sup> - Recline,**  
**2GTR<sup>™</sup> - Tilt/Recline)**

**DEALER:** This manual **MUST** be given to the user of the wheelchair.

**USER:** BEFORE using this wheelchair, read this manual and save for future reference.

For more information regarding  
Invacare products, parts, and services,  
please visit [www.invacare.com](http://www.invacare.com)



**Yes, you can.®**

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**⚠ WARNING**

**A QUALIFIED TECHNICIAN MUST PERFORM THE INITIAL SET UP OF THIS WHEELCHAIR. ALSO, A QUALIFIED TECHNICIAN MUST PERFORM ALL PROCEDURES IN THE SERVICE MANUAL.**

**WHEELCHAIR USERS: DO NOT SERVICE OR OPERATE THIS EQUIPMENT WITHOUT FIRST READING AND UNDERSTANDING (1) THE OWNER'S OPERATOR AND MAINTENANCE MANUAL AND (2) THE SEATING SYSTEM'S MANUAL (IF APPLICABLE). IF YOU ARE UNABLE TO UNDERSTAND THE WARNINGS, CAUTIONS, AND INSTRUCTIONS, CONTACT INVACARE TECHNICAL SUPPORT BEFORE ATTEMPTING TO SERVICE OR OPERATE THIS EQUIPMENT - OTHERWISE INJURY OR DAMAGE MAY RESULT.**

**DEALERS AND QUALIFIED TECHNICIANS: DO NOT SERVICE OR OPERATE THIS EQUIPMENT WITHOUT FIRST READING AND UNDERSTANDING (1) THE OWNER'S OPERATOR AND MAINTENANCE MANUAL, (2) THE SERVICE MANUAL (IF APPLICABLE) AND (3) THE SEATING SYSTEM'S MANUAL (IF APPLICABLE). IF YOU ARE UNABLE TO UNDERSTAND THE WARNINGS, CAUTIONS AND INSTRUCTIONS, CONTACT INVACARE TECHNICAL SUPPORT BEFORE ATTEMPTING TO SERVICE OR OPERATE THIS EQUIPMENT - OTHERWISE, INJURY OR DAMAGE MAY RESULT.**

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## **REFERENCE DOCUMENTS**

Refer to the table below for part numbers of additional documents which are referenced in this manual.

MANUAL	PART NUMBER
MKIV™ Electronics Manual	1043576
MKIV RII Electronics Manual	1095272
3G Storm Base Service Manual	1104849
2G Tarsys Service Manual	1090208

*NOTE: Updated versions of this manual are available on [www.invacare.com](http://www.invacare.com).*

## SPECIAL NOTES

Signal words are used in this manual and apply to hazards or unsafe practices which could result in personal injury or property damage. Refer to the table below for definitions of the signal words.

SIGNAL WORD	MEANING
DANGER	Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Caution indicates a potentially hazardous situation which, if not avoided, may result in property damage.

### NOTICE

**THE INFORMATION CONTAINED IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE.**

#### **WHEELCHAIR USER**

As a manufacturer of wheelchairs, Invacare endeavors to supply a wide variety of wheelchairs to meet many needs of the end user. However, final selection of the type of wheelchair to be used by an individual rests solely with the user and his/her healthcare professional capable of making such a selection. Invacare highly recommends working with a certified rehab technology supplier and/or a member of NRRTS or RESNA.

#### **WHEELCHAIR TIE-DOWN RESTRAINTS AND SEAT RESTRAINTS (TRRO OR TRBKTS)**

TRRO includes four factory-installed transport brackets and a wheelchair anchored pelvic belt. TRRO has been crash-tested in accordance with ANSI/RESNA WC Vol I Section 19 Frontal Impact Test requirements for wheelchairs with a 168 lb crash dummy, which corresponds to a person with a weight of 114 to 209 lbs.

TRBKTS includes four factory-installed wheelchair transport brackets. TRBKTS has not been crash-tested in accordance with WC 19. Use these transport brackets only to secure an unoccupied wheelchair during transport.

As of this date, the Department of Transportation has not approved any tie-down systems for transportation of a user while in a wheelchair, in a moving vehicle of any type. It is Invacare's position that users of wheelchairs should be transferred into appropriate seating in vehicles for transportation and use be made of the restraints made available by the auto industry. Invacare cannot and does not recommend any wheelchair transportation systems.

Refer to Transport Ready Package on page 122 for more information about transporting the wheelchair.

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## **⚠ TRRO AND TRBKTS WARNINGS**

Only use the transport brackets included with TRRO and TRBKTS for the purposes described in this manual.

Battery support brackets **MUST** be installed at all times. Otherwise, the wheelchair will not be WC/19 compliant. Refer to Installing/Removing Batteries Into/From Battery Boxes on page 90.

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## **⚠ WARNING**

Invacare products are specifically designed and manufactured for use in conjunction with Invacare accessories. Accessories designed by other manufacturers have not been tested by Invacare and are not recommended for use with Invacare products.

The seat positioning strap is a positioning belt **ONLY**. It is not designed for use as a safety device withstanding high stress loads such as auto or aircraft safety belts. If signs of wear appear, belt **MUST** be replaced immediately.

Wheelchairs should be examined during maintenance for signs of corrosion (water exposure, incontinence, etc.). Electrical components damaged by corrosion should be replaced **IMMEDIATELY**.

Wheelchairs that are used by incontinent users and/or are frequently exposed to water may require replacement of electrical components more frequently.

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## **⚠ POWERED SEATING SYSTEM WARNING**

This seating system has been custom designed and will be assembled to the wheelchair base before delivery to the user. The information contained in this manual is for maintaining and adjusting the seating system. There are very few adjustments that can safely be made by the user. If there is a procedure or adjustment that needs to be performed on the seating system that is not in this manual, **DO NOT** perform that procedure. Have the seating system serviced by a qualified technician.

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## **⚠ RECLINER WARNINGS**

**TO HEALTHCARE PROFESSIONALS/ASSISTANTS:**

Make sure the occupant of the wheelchair is properly positioned.

When returning the occupant of the wheelchair to the full upright position, more body strength will be required for approximately the last twenty degrees of incline (reverse recline). Make sure to use proper body mechanics (use your legs) or seek assistance if necessary to avoid injury.

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## REGISTER YOUR PRODUCT

The benefits of registering include:

1. Safeguarding your investment.
2. Ensuring long-term maintenance and servicing of your product.
3. Receiving updates with product information, maintenance tips and industry news.

**Register ONLINE at [warranty.invacare.com](http://warranty.invacare.com)**

Please have your model number and purchase date available to complete your registration.

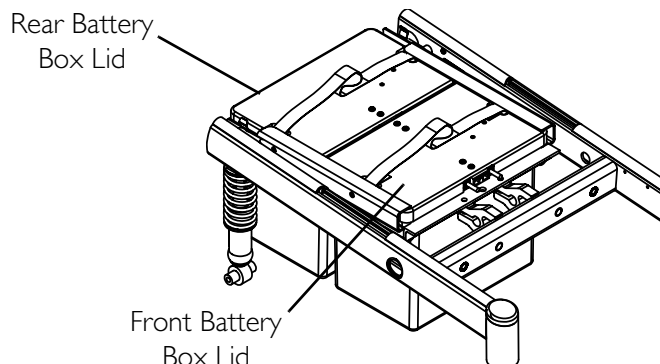
Any registration information you submit will only be used by Invacare Corporation and protected as required by applicable laws and regulations.

# LABEL LOCATIONS

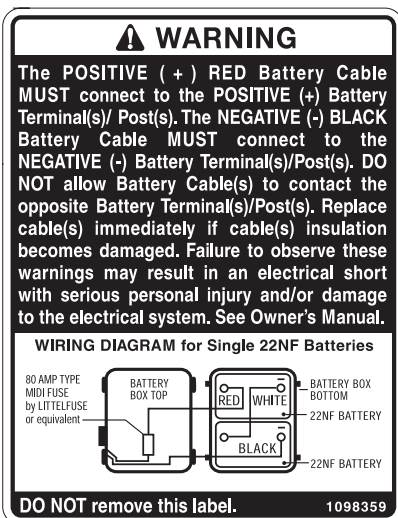
## All Wheelchairs

*NOTE: The battery labels shown on this page and the next are found on the inside of the battery box lids.*

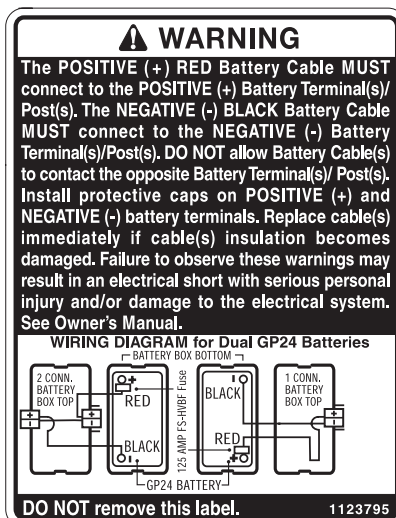
### Group 24 Batteries Only



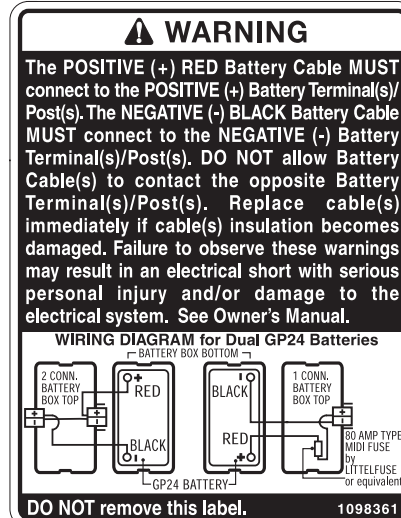
### 22NF Batteries Only



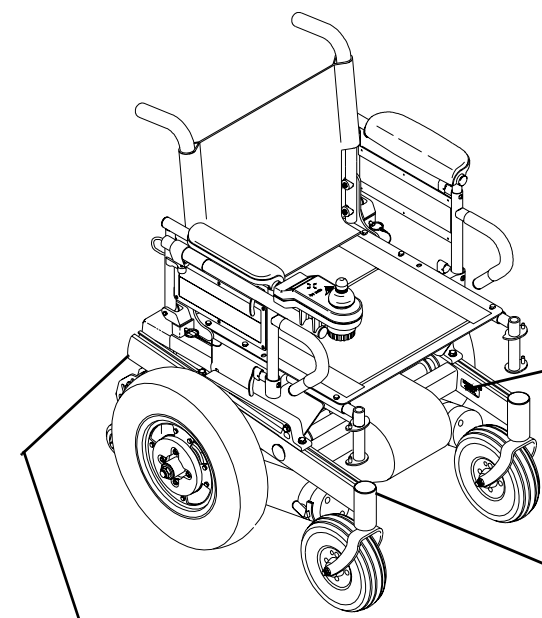
### Gearless Brushless GB™ Motors with Group 24 Batteries Only



### 4 Pole Motors with Group 24 Batteries Only



# LABEL LOCATIONS



Serial number label is located on the inside of the front or rear frame.

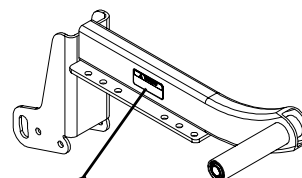
**WARNING**  
This stop **MUST** be in place **BEFORE** using. **DO NOT** remove.  
1070497

*NOTE: Warning label also found on side frame near the rear of the wheelchair.*

NO WHEELCHAIR HAS BEEN APPROVED FOR USE AS A SEATING SURFACE WITHIN A MOTOR VEHICLE. THIS LABEL IS FOR INFORMATIONAL PURPOSES ONLY. LIABILITY ISSUES WERE NOT CONSIDERED IN THE ATTACHMENT OF THIS LABEL.

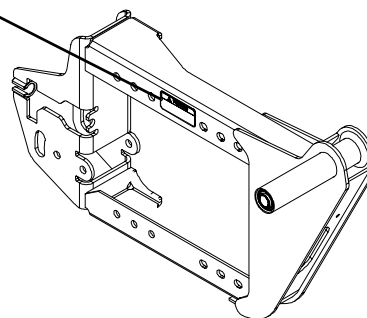
AUCUN FAUTEUIL ROULANT N'A ÉTÉ APPROUVÉ POUR ÊTRE UTILISÉ COMME SIÈGE À L'INTÉRIEUR D'UN VÉHICULE MOTORISÉ. CETTE ÉTIQUETTE NE PEUT ÊTRE UTILISÉE QU'À TITRE D'INFORMATION ET N'A PAS ÉTÉ AFFICHÉE ICI POUR DES RAISONS DE RESPONSABILITÉ LÉGALE

**Suspension Arm Used with Conventional Motor/ Gearbox Assembly**

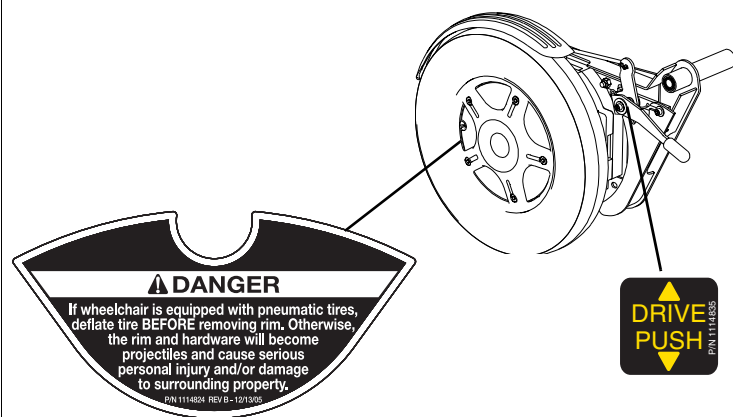


**! WARNING**  
When using a recliner/high back van seat, the motor/gearbox or motor **MUST** use most **REARWARD** mounting holes on the suspension arm assembly.  
1053056

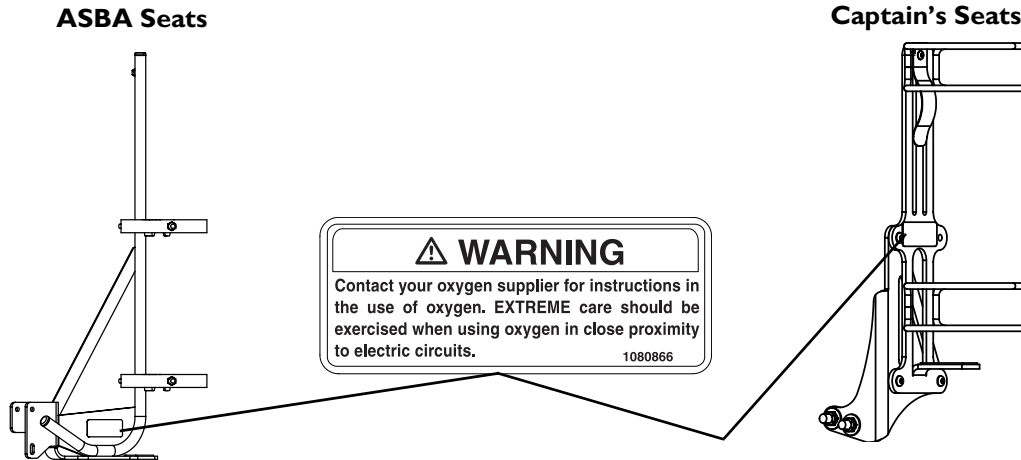
**Suspension Arm Used with Standard GB Motor**



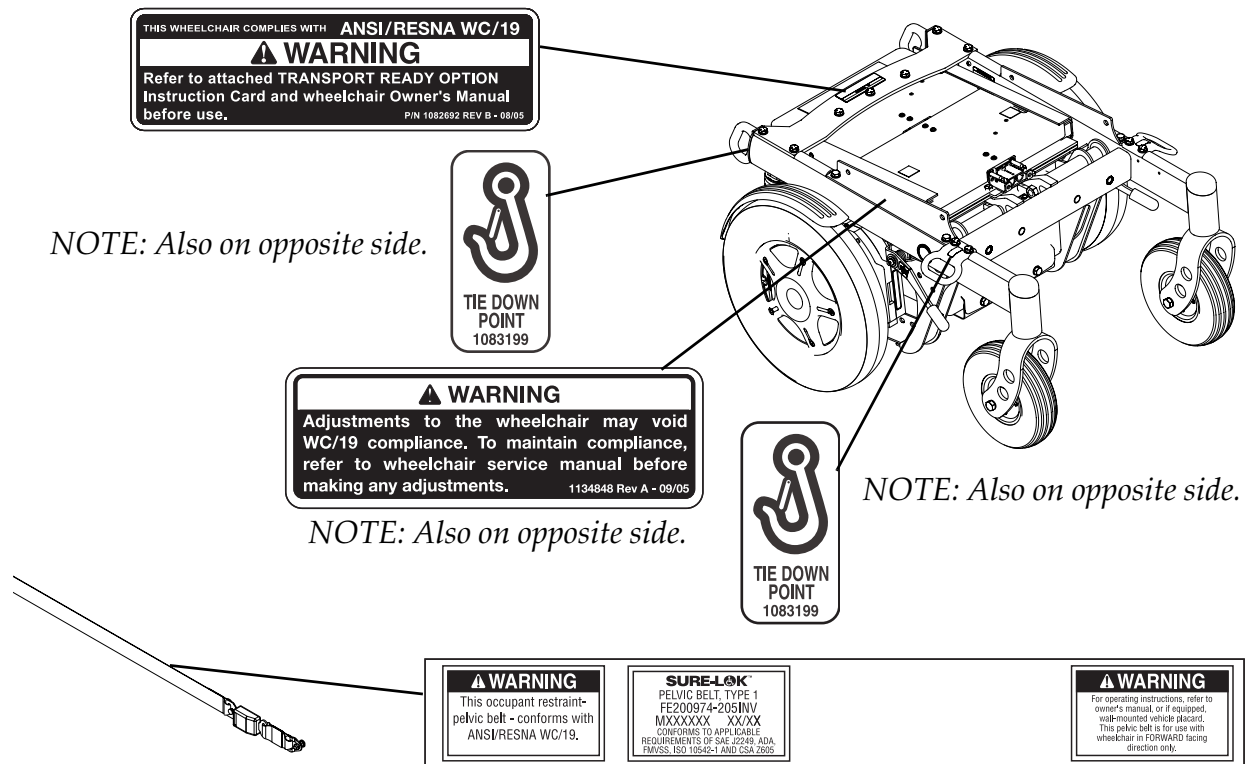
**Suspension Arm Used with GB Motor Shown**



## Wheelchairs with O<sub>2</sub> Holders

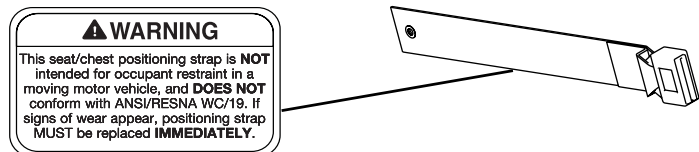


## Wheelchairs with TRRO



## Wheelchairs without TRRO

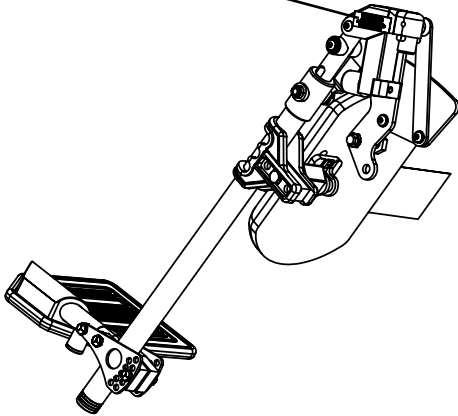
*NOTE: Auto style seat positioning strap shown. This label is also on the airline style seat positioning strap.*



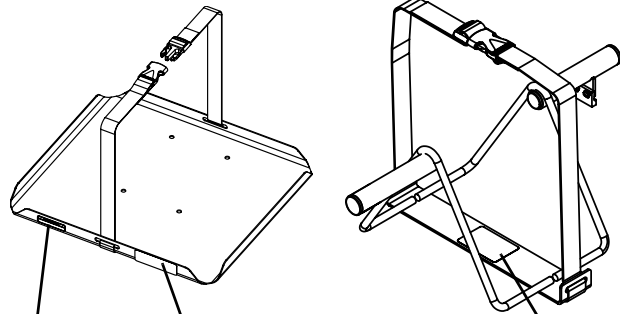
## Wheelchairs with 2G Tarsys

### Systems with Genius/Mechanical Legrests Only

**WARNING**  
DO NOT ATTACH TIE-DOWNS  
TO TILTING SEAT FRAME



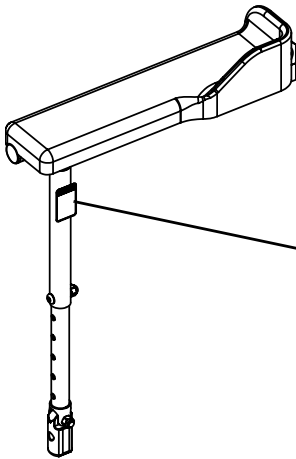
### Systems with Vent Trays Only



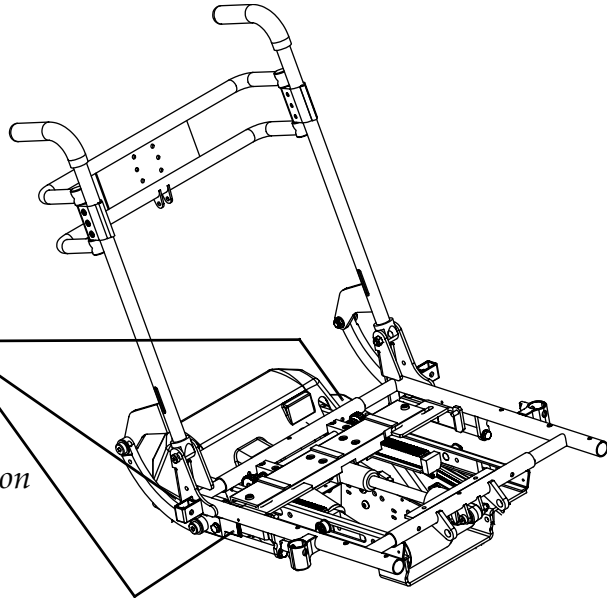
**WARNING**  
Maximum weight capacity of vent tray is 40 lbs.  
Otherwise, injury may result.  
1098164 RevA(1) - 03/00

**WARNING**  
The weight of the vent tray battery acts as a counterweight for this wheelchair. DO NOT operate wheelchair without vent tray battery installed, otherwise wheelchair will tip over resulting in serious injury.  
1098335 RevA(1) - 04/00

**WARNING**  
Chairs equipped with vent tray option: Reduced tilt/recline limits apply. See operating instructions. MKIV TRCM  
1081365

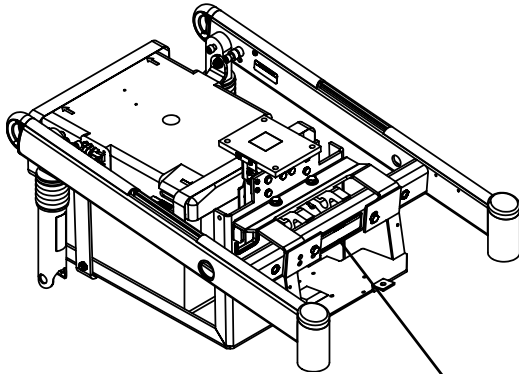


**WARNING**  
  
**Pinch Point**  
1079203



*NOTE: These labels are present on both sides of the seating system.*

## Wheelchairs with Elevating Seats



### **⚠ WARNING**

The elevating seat controller installed on this chair is not compatible with MKIV Controllers manufactured before August 2000. If you are uncertain about the date of manufacture, contact an authorized Invacare Dealer. **DO NOT REMOVE THIS LABEL.**

Rev A - 10/01 1106662

# TYPICAL PRODUCT PARAMETERS

## Arrow

	ARROW	
<b>SEAT WIDTH:</b>	Standard 12 to 24 inches	Recliner 16 to 24 inches
<b>SEAT DEPTH:</b>	Standard 12 to 22 inches	Recliner 16 to 22 inches
<b>BACK HEIGHT:</b>	Standard 12 to 24 inches	Recliner 18 to 26 inches
<b>BACK ANGLE RANGE:</b>	Standard 85° to 105°	Recliner 90° to 170°
<b>SEAT-TO-FLOOR:</b>	Standard 17½-inches	Optional 19¾ or 21 inches
<b>OVERALL WIDTH OF BASE:</b>	25 inches (without joystick)	
<b>OVERALL HEIGHT</b> STANDARD: MINIMUM: MAXIMUM:	34¼ inches 34¼ inches 44¼ inches	
<b>RECLINER</b> LOW SEAT FRAME: MEDIUM SEAT FRAME: HIGH SEAT FRAME:	51½ inches 53¾ inches 55½ inches	
<b>OVERALL LENGTH</b> STANDARD: LONG FRAME:	Without front riggings 29½ inches 32½ inches	
<b>WEIGHT</b> WITHOUT GP24 BATTERIES: WITH GP24 BATTERIES: SHIPPING (APPROX.):	174 lbs 278 lbs 214 lbs.	
<b>DRIVE AXLE:</b>	Adjustable (Non-Recliners ONLY)	
<b>DRIVE WHEELS/TIRES:</b>	14 x 3 inch (Foam filled or pneumatic)	
<b>CASTERS W/ PRECISION SEALED BEARINGS</b> SEMI-PNEUMATIC: PNEUMATIC OR FOAM FILLED:	8 x 2¼ inches (Std), 6 x 2 inches with shock fork (Opt) 8 x 2 inches (Std), 9 x 2¾ inches (Opt)	
<b>ANTI-TIPPER:</b>	3-inch wheels	
<b>CASTER FORKS:</b>	Standard, Shock Fork (Opt)	
<b>FOOTRESTS:</b>	Telescoping Front Rigging Supports (Std), Swing-Away (Std), Heavy Duty (Opt), 2-in. and 4-in. longer Pivot Slide Tube (Opt)	
<b>ARMRESTS:</b>	Flip Back, Fixed or Adjustable Height (Desk and Full Length)	
<b>SEAT ANGLE ADJUSTMENT:</b>	Adjustable (0° to 10°)	
<b>SEAT CUSHION:</b>	Cushion (Optional)	
<b>WHEELCHAIR UPHOLSTERY OPTIONS:</b>	Vinyl and Nylon	
<b>BATTERY REQUIREMENTS:</b>	Group 24	
<b>*WEIGHT LIMITATION:</b>	Up to 400 lbs.	
<b>PERFORMANCE</b> ***GB MOTOR Rating: Speed: **Range:	***Force to operate motor lock lever exceeds ANSI/ RESNA WC/VOL2-1998 requirements for section 14.7 paragraph 7.2d.  400 lbs. Up to 7 mph +/- 10% mph Up to 33 miles	

\*NOTE: Weight limitation is total weight (user weight plus any additional items that the user may require [back pack, etc.]). Example: If weight limitation of the wheelchair is 300 lbs and additional items equal 25 lbs, subtract 25 lbs from 300 lbs. This means the maximum weight limitation of the user is 275 lbs.

\*\*NOTE: Values for range are calculated for maximum chair weight rating using largest batteries applicable (GP24), per test procedures described in ANSI/RESNA WC/VOL2-1998 Section 4 and meet federal reimbursement requirements for this product. While considered typical, they are derived based on certain ideal conditions. Variances in battery condition, user weight, usage pattern or overall terrain conditions will result in actual values for range that differ from these stated values. Users should become accustomed to how their unique conditions impact their individual results. Users should become familiar with the battery discharge indicator on the joystick to determine the range of their wheelchair. Refer to When to Charge Batteries on page 97 for more information about the battery discharge indicator.

## Torque SP

	TORQUE SP	
<b>SEAT WIDTH:</b>	Standard 12 to 24 inches	Recliner 16 to 24 inches
<b>SEAT DEPTH:</b>	Standard 12 to 22 inches	Recliner 16 to 22 inches
<b>BACK HEIGHT:</b>	Standard 12 to 24 inches	Recliner 18 to 26 inches
<b>BACK ANGLE RANGE:</b>	Standard 85° to 105°	Recliner 90° to 170°
<b>SEAT-TO-FLOOR:</b>	Standard 17½-inches	Optional 19¾ or 21 inches
<b>OVERALL WIDTH OF BASE: (W/O JOYSTICK)</b>	25 inches	
<b>OVERALL HEIGHT</b>		
STANDARD:	34¼ inches	
MINIMUM:	34¼ inches	
MAXIMUM:	44¼ inches	
<b>RECLINER</b>		
LOW SEAT FRAME:	51½ inches	
MEDIUM SEAT FRAME:	53¾ inches	
HIGH SEAT FRAME:	55½ inches	
<b>OVERALL LENGTH</b>	Without front riggings	
STANDARD:	29½ inches	
LONG FRAME:	32½ inches	
<b>WEIGHT</b>		
MODEL 251 - 300 TQ (4 POLE MOTOR)		
Without 22NF Batteries:	154 lbs.	
With 22NF batteries:	228 lbs.	
Shipping (approx.):	194 lbs.	
MODEL 301 - 400 TQHD (4 POLE MOTOR)		
Without Group 24 Batteries:	154 lbs.	
With Group 24 Batteries:	258 lbs.	
Shipping (approx.):	194 lbs.	
MODEL TRUTK		
Without Group 24 Batteries:	166 lbs.	
With Group 24 Batteries:	270 lbs.	
Shipping (approx.):	206 lbs.	
<b>DRIVE AXLE:</b>	Adjustable (Non-Recliners ONLY)	

TYPICAL PRODUCT PARAMETERS

	TORQUE SP
<b>DRIVE WHEELS/TIRES:</b>	Foam filled or pneumatic 14 x 3 inches (Std), 14 x 4 inches - Not available with GB motors (Opt)
<b>CASTERS W/ PRECISION SEALED BEARINGS</b> SEMI-PNEUMATIC: PNEUMATIC OR FOAM FILLED:	8 x 1¼ inches (Std), 6 x 2 inches with shock fork (Opt) 8 x 2 inches (Std), 9 x 2¾ inches (Opt)
<b>ANTI-TIPPER:</b>	3-inch wheels (Std)
<b>CASTER FORKS:</b>	Standard, Shock Fork (Opt)
<b>FOOTRESTS:</b>	Telescoping Front Rigging Supports (Std), Swing-Away (Std), Heavy Duty (Opt), 2-in. and 4-in. longer Pivot Slide Tube (Opt)
<b>ARMRESTS:</b>	Flip Back, Fixed or Adjustable Height (Desk and Full Length)
<b>SEAT ANGLE ADJUSTMENT:</b>	Adjustable (0° to 10°)
<b>SEAT CUSHION:</b>	Cushion (Optional)
<b>WHEELCHAIR UPHOLSTERY OPTIONS:</b>	Vinyl and Nylon
<b>BATTERY REQUIREMENTS</b> 251-300 LBS - 4 POLE MOTOR: 301-400 LBS - 4 POLE MOTOR: UP TO 400 LBS - GB MOTOR:	22NF - Two batteries inside one battery box Group 24 Group 24
<b>*WEIGHT LIMITATION:</b> MODEL 251 - 300TQ - TORQUE SP WITH 4 POLE MOTOR MODEL 301 - 400TQ - TORQUE SP WITH 4 POLE MOTOR MODEL TRUTK - TORQUE SP WITH GB MOTOR	251 lbs. to 300 lbs. 301 lbs. to 400 lbs. Up to 400 lbs.
<b>PERFORMANCE</b> MODEL 251 - 300TQ Rating: Speed: *Range: MODEL 301 - 400TQ Rating: Speed: *Range: MODEL TRUTK Rating: Speed: **Range:	251 - 300 lbs. with 24:1 ratio 4 pole motor 251 - 300 lbs. with 18:1 ratio 4 pole motor Up to 4½ mph Up to 6½ mph Up to 19 Up to 19 301 - 400 lbs. with 24:1 ratio 4 pole motor Up to 4½ mph Up to 19 400 lbs. with GB motor Up to 7 mph Up to 33 miles

*\*NOTE: Weight limitation is total weight (user weight plus any additional items that the user may require [back pack, etc.]). Example: If weight limitation of the wheelchair is 300 lbs and additional items equal 25 lbs, subtract 25 lbs from 300 lbs. This means the maximum weight limitation of the user is 275 lbs.*

**\*\*NOTE:** Values for range are calculated for maximum chair weight rating using largest batteries applicable (GP24), per test procedures described in ANSI/RESNA WC/VOL2-1998 Section 4 and meet federal reimbursement requirements for this product. While considered typical, they are derived based on certain ideal conditions. Variances in battery condition, user weight, usage pattern or overall terrain conditions will result in actual values for range that differ from these stated values. Users should become accustomed to how their unique conditions impact their individual results. Users should become familiar with the battery discharge indicator on the joystick to determine the range of their wheelchair. Refer to When to Charge Batteries on page 97 for more information about the battery discharge indicator.

## Ranger X

	RANGER X	
<b>SEAT WIDTH:</b>	Standard 12 to 22 inches	Recliner 16 to 22 inches
<b>SEAT DEPTH:</b>	Standard 12 to 22 inches	Recliner 16 to 22 inches
<b>BACK HEIGHT:</b>	Standard 12 to 24 inches	Recliner 18 to 26 inches
<b>BACK ANGLE RANGE:</b>	Standard 85° to 105°	Recliner 90° to 170°
<b>SEAT-TO-FLOOR:</b>	Standard 17½-inches	Optional 19¾ or 21 inches
<b>OVERALL WIDTH OF BASE: (W/O JOYSTICK)</b>	25 inches	
<b>OVERALL HEIGHT</b>		
STANDARD:	34¼ inches	
MINIMUM:	34¼ inches	
MAXIMUM:	44¼ inches	
<b>RECLINER</b>		
LOW SEAT FRAME:	51½ inches	
MEDIUM SEAT FRAME:	53¾ inches	
HIGH SEAT FRAME:	55½ inches	
<b>OVERALL LENGTH</b>	Without front riggings	
STANDARD:	29½ inches	
LONG FRAME:	32½ inches	
<b>WEIGHT</b>		
GB MOTOR		
Without GP24 Batteries:	174 lbs	
With GP24 Batteries:	278 lbs	
Shipping (approx.):	214 lbs.	
4 POLE MOTOR		
Without GP24 Batteries:	162 lbs.	
With GP24 Batteries:	266 lbs.	
Shipping (approx.):	202 lbs.	
<b>DRIVE AXLE:</b>	Adjustable (Non-Recliners only)	
<b>DRIVE WHEELS/TIRES:</b>	Foam filled or pneumatic 14 x 3 inches (Std), 14 x 4 inches - not available with GB motors (Opt)	
<b>CASTERS W/ PRECISION SEALED BEARINGS</b>		
SEMI-PNEUMATIC:	8 x 2¼ inches (Std), 6 x 2 inches with shock fork (Opt)	
PNEUMATIC OR FOAM FILLED:	8 x 2 inches (Std), 9 x 2¾ inches (Opt)	
<b>ANTI-TIPPER (3-INCH WHEELS):</b>	Standard	

TYPICAL PRODUCT PARAMETERS

	RANGER X
<b>CASTER FORKS:</b>	Standard, Shock Fork (Optional)
<b>FOOTRESTS:</b>	Telescoping Front Rigging Supports (Std), Swing-Away (Std), Heavy Duty (Opt), 2-in. and 4-in. longer Pivot Slide Tube (Opt)
<b>ARMRESTS:</b>	Flip Back, Fixed or Adjustable Height (Desk and Full Length)
<b>SEAT ANGLE ADJUSTMENT:</b>	Adjustable (0° to 10°)
<b>SEAT CUSHION:</b>	Cushion (Opt)
<b>WHEELCHAIR UPHOLSTERY OPTIONS:</b>	Vinyl and Nylon
<b>BATTERY REQUIREMENTS:</b>	Group 24
<b>*WEIGHT LIMITATION:</b>	300 lbs.
<b>PERFORMANCE</b>	
GEARLESS/BRUSHLESS MOTOR	
Rating:	300 lbs.
Speed:	Up to 7 mph
**Range:	Up to 33 miles
STANDARD 4 POLE MOTOR	
Rating:	300 lbs.
Speed:	Up to 6½ mph
**Range:	Up to 19 miles

*\*NOTE: Weight limitation is total weight (user weight plus any additional items that the user may require [back pack, etc.]). Example: If weight limitation of the wheelchair is 300 lbs and additional items equal 25 lbs, subtract 25 lbs from 300 lbs. This means the maximum weight limitation of the user is 275 lbs.*

*\*\*NOTE: Values for range are calculated for maximum chair weight rating using largest batteries applicable (GP24), per test procedures described in ANSI/RESNA WC/VOL2-1998 Section 4 and meet federal reimbursement requirements for this product. While considered typical, they are derived based on certain ideal conditions. Variances in battery condition, user weight, usage pattern or overall terrain conditions will result in actual values for range that differ from these stated values. Users should become accustomed to how their unique conditions impact their individual results. Users should become familiar with the battery discharge indicator on the joystick to determine the range of their wheelchair. Refer to When to Charge Batteries on page 97 for more information about the battery discharge indicator.*

## 2G Tarsys

	2G TARSYS SEATING SYSTEM
<b>SEAT WIDTH RANGE:</b>	16 - 22 inches in 1-inch increments
<b>SEAT DEPTH RANGE:</b>	16 - 22 inches in 1-inch increments
<b>BACK HEIGHT RANGE</b> TILT/RECLINE: RECLINE: TILT:	20 - 26 inches in 1-inch increments 20 - 26 inches in 1-inch increments 20 - 25 inches in 1-inch increments
<b>BACK ANGLE RANGE</b> TILT:	90° - 115° in 5° increments
<b>TILT RANGE</b> TILT AND TILT/RECLINE 0° Seat Angle: 5° Seat Angle:	0° - 45° ± 3° 5° - 50° ± 3°
<b>RECLINE RANGE (MEASURED RELATIVE TO THE GROUND)</b> RECLINE 0° Seat Angle: 5° Seat Angle: TILT/RECLINE 0° Seat Angle: 5° Seat Angle:	90° - 175° ± 3° 95° - 175° ± 3° 90° - 175° ± 3° 95° - 175° ± 3°
<b>SEAT-TO-FLOOR</b> 0° SEAT ANGLE: 5° SEAT ANGLE:	18.25 inches ± .25 inches 19.75 inches ± .25 inches
<b>*OVERALL WIDTH:</b>	25 to 27 inches
<b>*OVERALL HEIGHT:</b>	53 inches
<b>*OVERALL LENGTH:</b>	48 inches in upright position
<b>ARMRESTS</b> TILT:  RECLINE AND TILT/RECLINE:	Flip Back, Adjustable Height (9 - 13 inches) - Desk or Full Length Adjustable Height (11 - 16 inches) - Desk or Full Length
<b>LEGRESTS:</b>	Mechanical Elevating, Genius Legrests, or Power Elevating Legrests
<b>HEADRESTS:</b>	Curved, Contoured, Small or Large
<b>WEIGHT OF SEATING SYSTEM:</b>	105 lbs
<b>**WEIGHT LIMITATION:</b> ALL SEATING SYSTEMS WITHOUT HEAVY DUTY OPTION: TILT ONLY, RECLINE ONLY OR TILT/RECLINE SYSTEMS WITH HEAVY DUTY OPTION: ALL SEATING SYSTEMS WITH VENT TRAY:	250 lbs 350 lbs Subtract 50 lbs from the seating system weight limitations (200 and 300 lbs respectively)

\*NOTE: Tilt/recline seating system, 18 inch deep x 18 inch wide, 24-inch high back, on short frame base with AT5544 front riggings in minimum position, 5° seat angle and headrest.

NOTE: All dimensions are ± .50 inches unless otherwise indicated.

NOTE: All parameters apply to Tilt only, Recline only and Tilt/Recline systems except where specified. All parameters are approximate.

**\*\*NOTE:** Weight limitation is total weight (user weight plus any additional items that the user may require [back pack, etc.]). Example: If weight limitation of the wheelchair is 300 lbs and additional items equal 25 lbs, subtract 25 lbs from 300 lbs. This means the maximum weight limitation of the user is 275 lbs.

### **⚠ WARNING**

**If the seating system is mounted onto a power wheelchair that has a weight limitation greater than 350 lbs, the weight limitation of the wheelchair is 350 lbs. Example: If a seating system with a weight limitation of 300 lbs is mounted onto a power wheelchair with a weight limitation of 350 lbs, then the power wheelchair is restricted to a 300 lb weight limitation.**

## **Elevating Seat/Power Tilt Only**

	ELEVATING SEAT/POWER TILT ONLY
<b>SEAT WIDTH RANGE</b> ANY SYSTEM WITH CURVED BACK: TILT ONLY WITH BACK POST ONLY: ELEVATE ONLY:	16 - 22 inches in 1-inch increments 12 - 22 inches in 1-inch increments 16 - 22 inches in 1-inch increments
<b>SEAT DEPTH RANGE</b> ANY SYSTEM WITH CURVED BACK: TILT ONLY WITH BACK POST ONLY: ELEVATE ONLY:	16 - 22 inches in 1-inch increments 12 - 22 inches in 1-inch increments 16 - 22 inches in 1-inch increments
<b>BACK HEIGHT RANGE:</b>	12 - 24 inches in 1-inch increments
<b>BACK ANGLE RANGE (ASBA):</b>	85° - 105° in 5° increments
<b>TILT RANGE</b> TILT AND TILT/ELEVATE 0° Seat Angle: 5° Seat Angle:	0° - 45° ± 3° 5° - 50° ± 3°
<b>SEAT-TO-FLOOR</b> ELEVATE ONLY 0° Seat Angle: 5° Seat Angle: TILT ONLY 0° Seat Angle: 5° Seat Angle: TILT/ELEVATE 0° Seat Angle: 5° Seat Angle:	17.5 inches ± .25 inches 18.25 inches ± .25 inches  18.25 inches ± .25 inches 19.25 inches ± .25 inches  18.5 inches ± .25 inches 19.5 inches ± .25 inches
<b>OVERALL WIDTH</b> WITHOUT JOYSTICK: WITH JOYSTICK:	22.25 - 26.25 inches 22.5 - 26.2 inches
<b>OVERALL HEIGHT</b> ELEVATE ONLY: TILT ONLY: TILT/ELEVATE:	37.5 inches 38.75 inches 39.25 inches
<b>OVERALL LENGTH (WITH FRONT RIGGINGS):</b>	41 inches (16-inch deep frame with AT5544 legrests)
<b>ARMRESTS:</b>	Adjustable Height (10.5 - 14.5 inches) - Desk or Full Length

	ELEVATING SEAT/POWER TILT ONLY
<b>WEIGHT OF POWER TILT ONLY:</b>	65 lbs
<b>WEIGHT OF ELEVATING SEAT:</b>	26 lbs
<b>WEIGHT LIMITATION</b>	
ELEVATE ONLY:	300 lbs
TILT ONLY MOUNTED ON TORQUE SP WITH RANGER II ELECTRONICS:	200 lbs
ALL OTHER TILT ONLY SYSTEMS:	250 lbs

*\*NOTE: 20 inch deep x 20 inch wide with 24-inch high back.*

*NOTE: All dimensions are  $\pm .50$  inches unless otherwise indicated.*

*NOTE: All parameters apply to Tilt only, Recline only and Tilt/Recline systems except where specified. All parameters are approximate.*

*\*\*NOTE: Weight limitation is total weight (user weight plus any additional items that the user may require [back pack, etc.]). Example: If weight limitation of the wheelchair is 300 lbs and additional items equal 25 lbs, subtract 25 lbs from 300 lbs. This means the maximum weight limitation of the user is 275 lbs.*

### **⚠ WARNING**

**If the seating system is mounted onto a power wheelchair that has a weight limitation greater than 350 lbs, the weight limitation of the wheelchair is 350 lbs. Example: If a seating system with a weight limitation of 300 lbs is mounted onto a power wheelchair with a weight limitation of 350 lbs, then the power wheelchair is restricted to a 300 lb weight limitation.**

# SECTION I—GENERAL GUIDELINES

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## **WARNING**

**SECTION I - GENERAL GUIDELINES** contains important information for the safe operation and use of this product. **DO NOT** use this product or any available optional equipment without first completely reading and understanding these instructions and any additional instructional material such as **Owner's Manuals, Service Manuals or Instruction Sheets** supplied with this product or optional equipment. If you are unable to understand the **Warnings, Cautions or Instructions**, contact a healthcare professional, dealer or technical personnel before attempting to use this equipment - otherwise, injury or damage may occur.

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## **Repair or Service Information**

Set-up of the Electronics Control Unit is to be performed only by a qualified technician. The final adjustments of the controller may affect other activities of the wheelchair. Damage to the equipment could occur if improperly set-up or adjusted.

Except for programming, **DO NOT** service or adjust the wheelchair while occupied, unless otherwise noted.

**POWERED SEATING SYSTEMS ONLY** - Pinch point may occur when lowering the elevating seat and/or returning the tilted seat to the full upright position. Make sure the hands and body of the occupant, attendants and bystanders are clear of all pinch points before lowering seat or returning the tilted seat to the full upright position.

Before adjusting, repairing or servicing the wheelchair, **ALWAYS** turn the wheelchair power OFF, otherwise, injury or damage may occur.

Invacare products are specifically designed and manufactured for use in conjunction with Invacare accessories. Accessories designed by other manufacturers have not been tested by Invacare and are not recommended for use with Invacare products.

Transport ready packages are not retrofittable to existing models and are not field serviceable.

Battery support brackets **MUST** be installed at all times. Otherwise, the wheelchair will not be WC/19 compliant. Refer to Installing/Removing Batteries Into/From Battery Boxes on page 90.

Wheelchairs should be examined during maintenance for signs of corrosion (water exposure, incontinence, etc.). Electrical components damaged by corrosion should be replaced **IMMEDIATELY**.

Wheelchairs that are used by incontinent users and/or are frequently exposed to water may require replacement of electrical components more frequently.

## Operation Information

Performance adjustments should only be made by professionals of the healthcare field or persons fully conversant with this process and the driver's capabilities. Incorrect settings could cause injury to the driver, bystanders, damage to the wheelchair and to surrounding property.

After the wheelchair has been set-up, check to make sure that the wheelchair performs to the specifications entered during the set-up procedure. If the wheelchair does NOT perform to specifications, turn the wheelchair OFF immediately and reenter set-up specifications. Repeat this section until the wheelchair performs to specifications.

DO NOT leave the power button ON when entering or exiting your wheelchair.

DO NOT operate on roads, streets or highways.

DO NOT climb, go up or down ramps or traverse slopes greater than 9°.

DO NOT attempt to move up or down an incline with water, ice or oil film.

DO NOT stand on the frame of the wheelchair.

DO NOT attempt to drive over curbs or obstacles. Doing so may cause your wheelchair to turn over and cause bodily harm or damage to the wheelchair.

DO determine and establish your particular safety limits by practicing bending, reaching and transferring activities in the presence of a qualified healthcare professional BEFORE attempting active use of the wheelchair.

DO NOT attempt to reach objects if you have to move forward in your seat.

DO NOT attempt to reach objects if you have to pick them up from the floor by reaching between your knees.

DO NOT lean over the top of the back upholstery to reach objects behind you, as this may cause the wheelchair to tip over.

ALWAYS shift your weight in the direction you are turning. DO NOT shift your weight in the opposite direction of the turn. Shifting your weight in the opposite direction of the turn may cause the inside drive wheel to lose traction and the wheelchair to tip over.

DO NOT shift your weight or sitting position toward the direction you are reaching as the wheelchair and/or seating system (if any) may tip over.

DO NOT use an escalator to move a wheelchair between floors. Serious bodily injury may occur.

DO NOT use the footplates as a platform. When getting in or out of the wheelchair, make sure that the footplates are in the upward position or swing footrests towards the outside of the wheelchair.

NEVER leave an unoccupied wheelchair unattended on an incline.

DO NOT attempt to stop a moving wheelchair with the wheel locks. Wheel locks are not brakes.

Inasmuch as wheel locks are an option on this wheelchair, (You may order with or without wheel locks.) transfer to and from the wheelchair in the presence of a qualified healthcare professional to determine individual safety limits. Invacare strongly recommends ordering the wheel locks as an additional safeguard for the wheelchair user.

DO NOT attempt to lift the wheelchair by any removable (detachable) parts. Lifting by means of any removable (detachable) parts of a wheelchair may result in injury to the user or damage to the wheelchair.

DO NOT overtighten hardware attaching to the frame. This could cause damage to the frame tubing.

ALWAYS keep hands and fingers clear of moving parts to avoid injury.

ALWAYS wear your seat positioning strap. The seat positioning strap is a positioning belt ONLY. It is not designed for use as a safety device withstanding high stress loads such as auto or aircraft safety belts. If signs of wear appear, belt MUST be replaced immediately.

ALWAYS turn the wheelchair power OFF and engage the motor locks/clutches to prevent the wheels from moving BEFORE attempting to transfer in or out of the wheelchair. Also make sure every precaution is taken to reduce the gap distance. Align both casters parallel with the object you are transferring onto.

DO NOT use with a broken or missing joystick knob.

DO NOT use if joystick does not spring back to the neutral position or becomes sticky or sluggish.

DO NOT use if joystick boot is torn or damaged.

ALWAYS check foam grips for looseness before using the wheelchair. If loose, contact a qualified technician for instructions.

ALWAYS engage both wheel locks AND reduce the gap distance BEFORE transferring to and from the wheelchair. Turn all casters parallel to the object you are transferring onto.

Anti-Tippers must be used at all times. When outdoors on wet, soft ground or on gravel surfaces, anti-tippers may not provide the same level of protection against tip over. Extra caution must be observed when traversing such surfaces.

Avoid storing or using the wheelchair near open flame or combustible products. Serious injury or damage to property may result.

DO NOT engage or disengage the motor locks until the power is in the OFF position.

### **Wheelchairs with TRRO or TRBKTS Only**

Only use the transport brackets included with TRRO and TRBKTS for the purposes described in this manual.

### **Wheelchairs with Powered Seating Systems Only**

DO NOT operate the seating system while on an incline.

DO NOT operate the seating system while the wheelchair is moving.

NEVER operate the wheelchair or elevate/lower the seat while in any tilted/reclined/back angle position over 20° relative to the vertical position. If the drive lock-out does not stop the wheelchair from operating or the seat from elevating/lowering in a tilt position over 20° relative to vertical, DO NOT operate the wheelchair or elevate/lower the seat. DO NOT attempt to adjust the drive lock-out. Have the wheelchair serviced by a qualified technician.

Use only TSS, TRSS, TRCM, and SAC actuator controls to activate the tilt/recline/elevate functions\*. DO NOT USE any other actuator controls. Such devices may result in excess heating and cause damage to the actuator and associated wiring and could cause a fire, death, physical injury or property damage. If such devices are used, Invacare shall not be liable and the limited warranty is void.

*\*NOTE: Specific actuator controls are noted for each function or combination throughout this manual.*

DO NOT operate tilt seat around children.

ALWAYS keep hands and feet out from underneath tilt seat - otherwise serious injury may result.

DO NOT tip the seating system/wheelchair without assistance.

DO NOT store items under seat.

Cables must be routed and secured properly to ensure that cables DO NOT become entangled and damaged during normal operation of seating system.

2G Tarsys Equipped with Vent Tray Only - Reduced tilt/recline limits apply. See the electronics manual listed in Reference Documents on page 2.

2G Tarsys Equipped with Power Legrests Only - NEVER allow items to become trapped between the legrest assemblies, otherwise damage to the power legrest may occur.

### **Wheelchairs with Manual Recliners Only**

NEVER operate the wheelchair while in any recline position over 105° relative to the seat frame. If the limit switch does not stop the wheelchair from operating in a recline position greater than 105° relative to the seat frame, DO NOT operate the wheelchair. Have the limit switch adjusted by a qualified technician.

Both gas cylinders MUST be operational and adjusted properly before using the recliner. DO NOT operate the recliner option if only one of the gas cylinders is operational or adjusted properly.

When using the recliner option, the motor/gearbox or motor MUST be mounted to the most rearward mounting holes on the suspension arm assembly.

### **To Healthcare Professionals/Assistants**

Make sure the occupant of the wheelchair is properly positioned.

When returning the occupant of the wheelchair to the full upright position, more body strength will be required for approximately the last twenty degrees of incline (reverse recline). Make sure to use proper body mechanics (use your legs) or seek assistance if necessary to avoid injury.

## Tire Pressure

DO NOT use your wheelchair unless it has the proper tire pressure (P.S.I.). DO NOT overinflate the tires. Failure to follow these recommendations may cause the tire to explode and cause bodily harm. The recommended tire pressure is listed on the side wall of the tire.

## Electrical

### Grounding Instructions:

DO NOT, under any circumstances, cut or remove the round grounding prong from any plug used with or for Invacare products. Some devices are equipped with three-prong (grounding) plugs for protection against possible shock hazards. Where a two-prong wall receptacle is encountered, it is the personal responsibility and obligation of the customer to contact a qualified electrician and have the two-prong receptacle replaced with a properly grounded three-prong wall receptacle in accordance with the National Electrical Code. If you must use an extension cord, use ONLY a three-wire extension cord having the same or higher electrical rating as the device being connected. In addition, Invacare has placed RED/ORANGE Warning Tags on some equipment. DO NOT remove these tags.

## Batteries

The warranty and performance specifications contained in this manual are based on the use of deep cycle gel cell batteries. Invacare strongly recommends their use as the power source for this unit.

Carefully read battery/battery charger information prior to installing, servicing or operating your wheelchair.

### Charging Batteries

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#### **DANGER**

**When using an extension cord, use only a three wire extension cord having at least 16 AWG (American Wire Gauge) wire and the same or higher electrical rating as the device being connected. Use of improper extension cord could result in risk of fire and electric shock. Three prong to two prong adapters should not be used. Use of three prong adapters can result in improper grounding and present a shock hazard to the user.**

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NEVER attempt to recharge the batteries by attaching cables directly to the battery terminals.

DO NOT attempt to recharge the batteries and operate the wheelchair at the same time.

DO NOT operate wheelchair with extension cord attached to the AC cable.

DO NOT attempt to recharge the batteries when the wheelchair has been exposed to any type of moisture.

DO NOT attempt to recharge the batteries when the wheelchair is outside.

DO NOT sit in the wheelchair while charging the batteries.

READ and CAREFULLY follow the manufacturer's instructions for each charger (supplied or purchased). If charging instructions are not supplied, consult a qualified technician for proper procedures.

Ensure the pins of the extension cord plug are the same number, size, and shape as those on the charger.

DO NOT under any circumstances cut or remove the round grounding plug from the charger AC cable plug or the extension cord plug.

## **Rain Test**

Invacare has tested its power wheelchairs in accordance with ISO 7176 "Rain Test". This provides the end user or his/her attendant sufficient time to remove his/her power wheelchair from a rain storm and retain wheelchair operation.

DO NOT leave power wheelchair in a rain storm of any kind.

DO NOT use power wheelchair in a shower.

DO NOT leave power wheelchair in a damp area for any length of time.

Direct exposure to rain or dampness will cause the wheelchair to malfunction electrically and mechanically; may cause the wheelchair to prematurely rust.

Check to ensure that the battery covers are secured in place, joystick boot is NOT torn or cracked where water can enter and that all electrical connections are secure at all times.

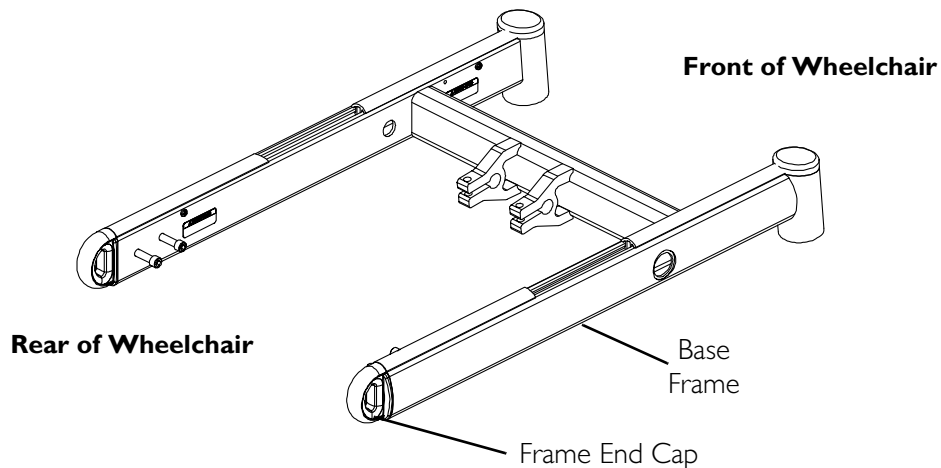
DO NOT use the joystick if the boot is torn or cracked. If the joystick boot becomes torn or cracked, replace Immediately.

## **Weight Training**

Invacare DOES NOT recommend the use of its wheelchairs as a weight training apparatus. Invacare wheelchairs have NOT been designed or tested as a seat for any kind of weight training. If occupant uses said wheelchair as a weight training apparatus, INVACARE SHALL NOT BE LIABLE FOR BODILY INJURY AND THE WARRANTY IS VOID.

## **Shipping Securement Points**

Frame end caps are only intended for manufacturer's initial shipping securement points. They are not intended for any other use.



## Weight Limitation

### 3G Storm Wheelchairs without Powered Seating Systems

Refer to Typical Product Parameters for Arrow on page 16, Torque SP on page 17 or Ranger X on page 19 to determine the weight limit (total combined weight of user and any attachments) of your wheelchair model. DO NOT exceed the limit - otherwise, injury or damage may result.

### 3G Storm Wheelchairs with Powered Seating Systems

Refer to Typical Product Parameters to determine the weight limit (total combined weight of user and any attachments) of your wheelchair and seating system. The weight limitation indicated overrides the weight limitation of the wheelchair by itself. DO NOT exceed the limit - otherwise injury or damage may result. Typical Product Parameters can be found for:

- 2G Tarsys on page 21.
- Elevating Seat/Power Tilt Only on page 22.

## SECTION 2—SAFETY/HANDLING OF WHEELCHAIRS

“Safety and Handling” of the wheelchair requires the close attention of the wheelchair user as well as the assistant. This manual points out the most common procedures and techniques involved in the safe operation and maintenance of the wheelchair. It is important to practice and master these safe techniques until you are comfortable in maneuvering around the frequently encountered architectural barriers.

Use this information only as a “basic” guide. The techniques that are discussed on the following pages have been used successfully by many.

Individual wheelchair users often develop skills to deal with daily living activities that may differ from those described in this manual. Invacare recognizes and encourages each individual to try what works best for him/her in overcoming architectural obstacles that they may encounter, however all warnings and cautions given in this manual **MUST** be followed. Techniques in this manual are a starting point for the new wheelchair user and assistant with “safety” as the most important consideration for all.

### Stability and Balance

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#### **WARNING**

**ALWAYS** wear your seat positioning strap. The seat positioning strap is a positioning belt **ONLY**. It is not designed for use as a safety device withstanding high stress loads such as auto or aircraft safety belts. If signs of wear appear, belt **MUST** be replaced immediately.

**DO NOT** climb, go **UP** or **DOWN** ramps or traverse slopes greater than 9°.

Invacare strongly recommends proceeding down ramps or slopes slowly to avoid hard braking or sudden stops.

**DO NOT** leave elevating legrests in the fully extended position when proceeding down ramps or slopes.

Be aware that carrying heavy objects on your lap while occupying the wheelchair may adversely affect the stability of the wheelchair, resulting in serious bodily injury to the user, damage to the wheelchair and surrounding property.

This wheelchair has been designed to accommodate one individual. If more than one individual occupies the wheelchair this may adversely affect the stability of the wheelchair, resulting in serious bodily injury to the user and passenger and damage to the wheelchair and surrounding property.

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To assure stability and proper operation of your wheelchair, you must at all times maintain proper balance. Your wheelchair has been designed to remain upright and stable during normal daily activities as long as you DO NOT move beyond the center of gravity. DO NOT lean forward out of the wheelchair any further than the length of the armrests. Make sure the casters are pointing in the forward position whenever you lean forward. This can be achieved by advancing the wheelchair and then reversing it in a straight line.

## Coping with Everyday Obstacles

Coping with the irritation of everyday obstacles can be somewhat alleviated by learning how to manage your wheelchair. Keep in mind your center of gravity to maintain stability and balance.

## A Note to Wheelchair Assistants

When assistance to the wheelchair user is required, remember to use good body mechanics. Keep your back straight and bend your knees whenever tilting wheelchair or traversing curbs or other impediments.

Also, be aware of detachable parts such as arms or legrests. These must NEVER be used to move the wheelchair or as lifting supports, as they may be inadvertently released, resulting in possible injury to the user and/or assistant(s).

When learning a new assistance technique, have an experienced assistant help you before attempting it alone.

## Percentage of Weight Distribution

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### **WARNING**

**DO NOT** attempt to reach objects if you have to move forward in the seat or pick them up from the floor by reaching down between your knees.

Many activities require the wheelchair user to reach, bend and transfer in and out of the wheelchair. These movements will cause a change to the normal balance, center of gravity, and weight distribution of the wheelchair. To determine and establish your particular safety limits, practice bending, reaching and transferring activities in several combinations in the presence of a qualified healthcare professional **BEFORE** attempting active use of the wheelchair.

Proper positioning is essential for your safety. When reaching, leaning, bending or bending forward, it is important to use the casters as a tool to maintain stability and balance.

When using the recliner/high back van seat, the motor/gearbox or motor **MUST** use most **REARWARD** mounting holes on the suspension arm assembly.

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*NOTE: For this procedure, refer to FIGURE 2.1.*

Changing the position of where the motors are positioned affects the weight distribution over the rear wheels. The following contains information about changing the position of the motors.

**Rear Position** - Lengthens the wheelbase and gives the wheelchair the most stability and standard maneuverability.

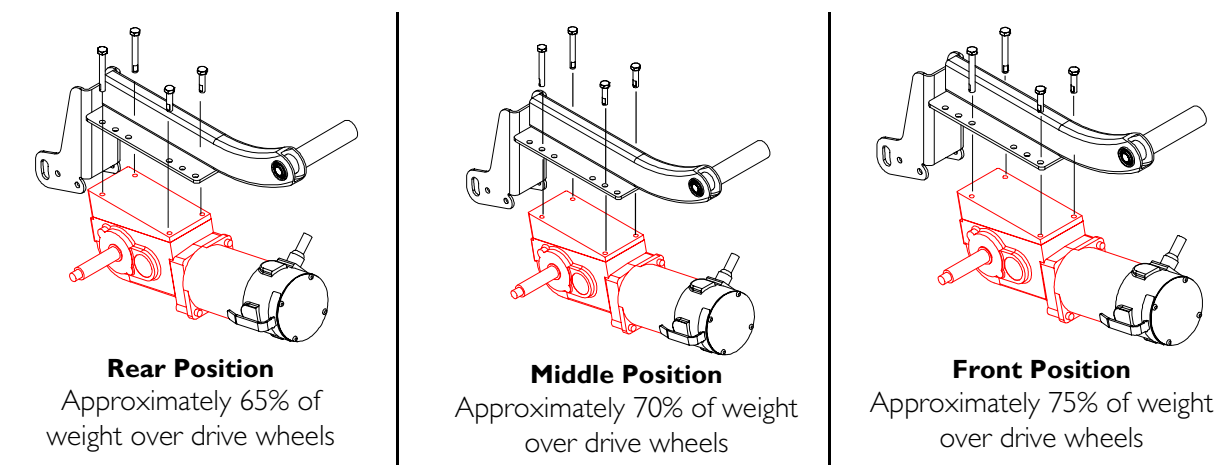
**Middle Position** - Centers the wheelbase and gives the wheelchair standard stability and maneuverability.

**Forward Position** - Shortens the wheelbase and increases maneuverability and distributes additional weight on rear wheels.

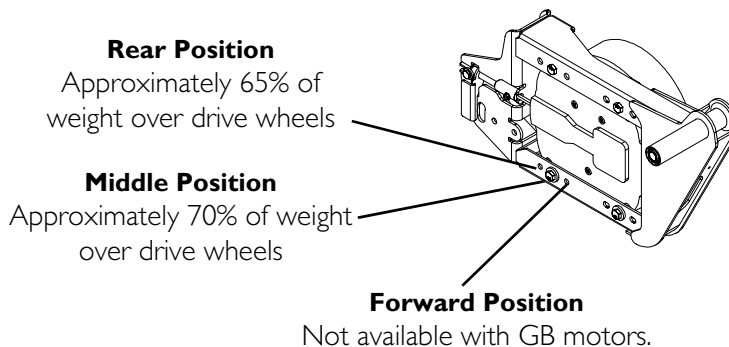
*\*NOTE: The forward mounting position is not available on Arrow wheelchairs equipped with GB motors.*

The following shows the positions of the screws into the gearbox:

**DETAIL "A" - MOTOR/GEARBOX WHEELCHAIRS**



**DETAIL "B" - \*GB WHEELCHAIRS**



**FIGURE 2.1** Percentage of Weight Distribution

## Reaching, Leaning and Bending - Forward

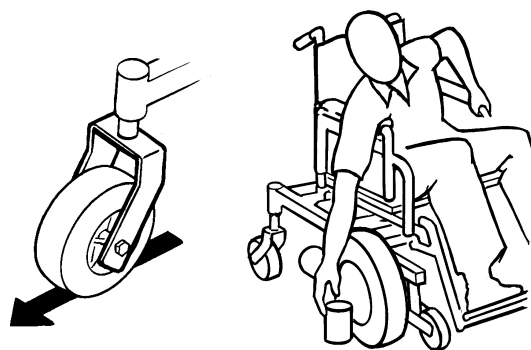
### **⚠ WARNING**

**DO NOT** attempt to reach objects if you have to move forward in the seat or pick them up from the floor by reaching down between your knees.

Inasmuch as wheel locks are an option on this wheelchair, (You may order with or without wheel locks.) transfer to and from the wheelchair in the presence of a qualified healthcare professional to determine individual safety limits. Invacare strongly recommends ordering the wheel locks as an additional safeguard for the wheelchair user.

*NOTE: For this procedure, refer to FIGURE 2.2.*

Position the casters so that they are extended away from the drive wheels and engage wheel locks/motor locks/clutches.



**FIGURE 2.2** Reaching, Leaning and Bending  
- Forward

## Reaching, Leaning and Bending - Backward

### **⚠ WARNING**

**DO NOT** lean over the top of the back upholstery. This will change your center of gravity and may cause you to tip over.

*NOTE: For this procedure, refer to FIGURE 2.3.*

Position wheelchair as close as possible to the desired object. Position the casters so that they are extended away from the drive wheels to create the longest possible wheelbase. Reach back only as far as your arm will extend without changing your sitting position.



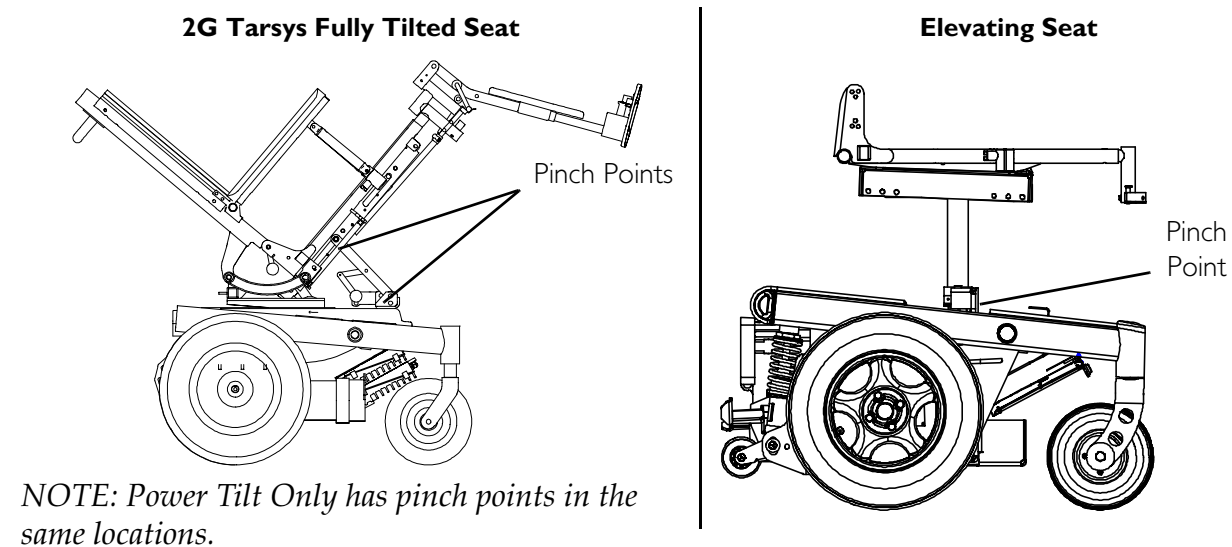
**FIGURE 2.3** Reaching, Leaning and Bending  
- Backward

## Pinch Points

### **⚠ WARNING**

**POWERED SEATING SYSTEMS ONLY** - Pinch point may occur when lowering the elevating seat and/or returning the tilted seat to the full upright position. Make sure the hands and body of the occupant, attendants and bystanders are clear of all pinch points before lowering seat or returning the tilted seat to the full upright position.

*NOTE: For this procedure, refer to FIGURE 2.4.*



**FIGURE 2.4** Pinch Points

## Stairways

### **⚠ WARNING**

**DO NOT** attempt to move an occupied power wheelchair between floors using a stairway. Use an elevator to move an occupied power wheelchair between floors. If moving a power wheelchair between floors by means of a stairway, the occupant **MUST** be removed and transported independently of the power wheelchair.

Extreme caution is advised when it is necessary to move an unoccupied power wheelchair up or down the stairs. Invacare recommends using two assistants and making thorough preparations. Make sure to use **ONLY** secure, non-detachable parts for hand-hold supports.

**DO NOT** attempt to lift the wheelchair by any removable (detachable) parts. Lifting by means of any removable (detachable) parts of a wheelchair may result in injury to the user or damage to the wheelchair.

The weight of the wheelchair without the user and without batteries is between 154 and 278 lbs. Use proper lifting techniques (lift with your legs) to avoid injury.

Follow this procedure for moving the wheelchair between floors when an elevator is NOT available:

*NOTE: When using a stairway to move the wheelchair and any accessories, move all wheelchair components away from the stairway prior to reassembly.*

1. Remove the occupant from the wheelchair.
2. Remove battery box(es) from wheelchair. Refer to Batteries on page 88.
3. Bend your knees and keep your back straight.
4. Using non-removable (non-detachable) parts of the wheelchair, lift the wheelchair off of the ground and transfer the wheelchair up or down the stairs.
5. The wheelchair should not be lowered until the last stair has been negotiated and the wheelchair has been carried away from the stairway.

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**⚠ WARNING: ESCALATORS**

**DO NOT** use an escalator to move a wheelchair between floors. Serious bodily injury may occur.

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## Transferring To and From Other Seats

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**⚠ WARNING**

**ALWAYS** turn the wheelchair power **OFF** and engage the motor locks/clutches to prevent the wheels from moving **BEFORE** attempting to transfer in or out of the wheelchair. Also make sure every precaution is taken to reduce the gap distance. Align both casters parallel with the object you are transferring onto.

Inasmuch as wheel locks are an option on this wheelchair, (You may order with or without wheel locks.) transfer to and from the wheelchair in the presence of a qualified healthcare professional to determine individual safety limits. Invacare strongly recommends ordering the wheel locks as an additional safeguard for the wheelchair user.

---

**CAUTION**

**When transferring, position yourself as far back as possible in the seat. This will prevent broken screws, damaged upholstery and the possibility of the wheelchair tipping forward.**

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*NOTE: For this procedure, refer to FIGURE 2.5 on page 37.*

*NOTE: Adequate mobility and upper body strength is required to perform this activity independently.*

1. Position the wheelchair as close as possible along side the seat to which you are transferring, with the casters aligned parallel with the object.
2. Engage motor locks and wheel locks. Refer to Disengaging/Engaging Motor Lock Levers on page 109.

3. Shift body weight into seat with transfer.

*NOTE: During independent transfer, little or no seat platform will be beneath you. Use a transfer board if at all possible.*



**FIGURE 2.5** Transferring To and From Other Seats

## SECTION 3—EMI INFORMATION

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### **WARNING**

**CAUTION: IT IS VERY IMPORTANT THAT YOU READ THIS INFORMATION REGARDING THE POSSIBLE EFFECTS OF ELECTROMAGNETIC INTERFERENCE ON YOUR POWERED WHEELCHAIR.**

#### Electromagnetic Interference (EMI) From Radio Wave Sources

Powered wheelchairs and motorized scooters (in this text, both will be referred to as powered wheelchairs) may be susceptible to electromagnetic interference (EMI), which is interfering electromagnetic energy (EM) emitted from sources such as radio stations, TV stations, amateur radio (HAM) transmitters, two way radios, and cellular phones. The interference (from radio wave sources) can cause the powered wheelchair to release its brakes, move by itself, or move in unintended directions. It can also permanently damage the powered wheelchair's control system. The intensity of the interfering EM energy can be measured in volts per meter (V/m). Each powered wheelchair can resist EMI up to a certain intensity. This is called its “immunity level”. The higher the immunity level, the greater the protection. At this time, current technology is capable of achieving at least a 20 V/m immunity level, which would provide useful protection from the more common sources of radiated EMI.

There are a number of sources of relatively intense electromagnetic fields in the everyday environment. Some of these sources are obvious and easy to avoid. Others are not apparent and exposure is unavoidable. However, we believe that by following the warnings listed below, your risk to EMI will be minimized.

The sources of radiated EMI can be broadly classified into three types:

- 1) Hand-held Portable transceivers (transmitters-receivers with the antenna mounted directly on the transmitting unit. Examples include: citizens band (CB) radios, “walkie talkie”, security, fire and police transceivers, cellular telephones, and other personal communication devices).

*NOTE: Some cellular telephones and similar devices transmit signals while they are ON, even when not being used.*

- 2) Medium-range mobile transceivers, such as those used in police cars, fire trucks, ambulances and taxis. These usually have the antenna mounted on the outside of the vehicle; and
- 3) Long-range transmitters and transceivers, such as commercial broadcast transmitters (radio and TV broadcast antenna towers) and amateur (HAM) radios.

*NOTE: Other types of hand-held devices, such as cordless phones, laptop computers, AM/FM radios, TV sets, CD players, cassette players, and small appliances, such as electric shavers and hair dryers, so far as we know, are not likely to cause EMI problems to your powered wheelchair.*

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**⚠ WARNING****Powered Wheelchair Electromagnetic Interference (EMI)**

Because EM energy rapidly becomes more intense as one moves closer to the transmitting antenna (source), the EM fields from hand-held radio wave sources (transceivers) are of special concern. It is possible to unintentionally bring high levels of EM energy very close to the powered wheelchair's control system while using these devices. This can affect powered wheelchair movement and braking. Therefore, the warnings listed below are recommended to prevent possible interference with the control system of the powered wheelchair.

Electromagnetic interference (EMI) from sources such as radio and TV stations, amateur radio (HAM) transmitters, two-way radios, and cellular phones can affect powered wheelchairs and motorized scooters.

**FOLLOWING THE WARNINGS LISTED BELOW SHOULD REDUCE THE CHANCE OF UNINTENDED BRAKE RELEASE OR POWERED WHEELCHAIR MOVEMENT WHICH COULD RESULT IN SERIOUS INJURY.**

- 1) **DO NOT** operate hand-held transceivers (transmitters receivers), such as citizens band (CB) radios, or turn **ON** personal communication devices, such as cellular phones, while the powered wheelchair is turned **ON**;
- 2) Be aware of nearby transmitters, such as radio or TV stations, and try to avoid coming close to them;
- 3) If unintended movement or brake release occurs, turn the powered wheelchair **OFF** as soon as it is safe;
- 4) Be aware that adding accessories or components, or modifying the powered wheelchair, may make it more susceptible to EMI (**NOTE:** There is no easy way to evaluate their effect on the overall immunity of the powered wheelchair); and
- 5) Report all incidents of unintended movement or brake release to the powered wheelchair manufacturer, and note whether there is a source of EMI nearby.

**Important Information**

- 1) 20 volts per metre (V/m) is a generally achievable and useful immunity level against EMI (as of May 1994) (the higher the level, the greater the protection);
- 2) This device has been tested to a radiated immunity level of 20 volts per meter.
- 3) The immunity level of the product is unknown.

**Modification of any kind to the electronics of this wheelchair as manufactured by Invacare may adversely affect the EMI immunity levels.**

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## SECTION 4—SAFETY INSPECTION/ TROUBLESHOOTING

*NOTE: Every six months take your wheelchair to a qualified technician for a thorough inspection and servicing. Regular cleaning will reveal loose or worn parts and enhance the smooth operation of your wheelchair. To operate properly and safely, your wheelchair must be cared for just like any other vehicle. Routine maintenance will extend the life and efficiency of your wheelchair.*

### Safety Inspection Checklists

Initial adjustments should be made to suit your personal body structure needs and preference. Thereafter follow these maintenance procedures:

#### All Wheelchairs

##### Inspect/Adjust Initially

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#### CAUTION

**As with any vehicle, the wheels and tires should be checked periodically for cracks and wear, and should be replaced.**

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- ☐ Make sure wheelchair rolls straight (no excessive drag or pull to one side).
- ☐ Inspect all fasteners.
- ☐ Make sure clothing guards are secure.
- ☐ Make sure arms are secure but easy to release and adjustment levers engage properly.
- ☐ Make sure adjustable height arms operate and lock securely.
- ☐ Make sure upholstery has no rips.
- ☐ Make sure armrest pad sits flush against arm tube.
- ☐ Make sure axle nut and wheel mounting nuts are secure on drive wheels.
- ☐ Make sure there is no excessive side movement or binding when drive wheels are lifted and spun when disengaged (free-wheeling).
- ☐ Ensure that casters are free of debris.
- ☐ Inspect wheel/fork assembly for proper tension by spinning caster; caster should come to a gradual stop.
- ☐ Loosen/tighten caster locknut if wheel wobbles noticeably or binds to a stop.
- ☐ Make sure all caster/wheel/fork/headtube fasteners are secure and not damaged/missing.
- ☐ Make sure wheel locks DO NOT interfere with tires when rolling.
- ☐ Make sure wheel lock pivot point are free of wear and looseness.

- ☐ Make sure wheel locks are easy to engage.
- ☐ Inspect tires for flat spots and wear.
- ☐ Check pneumatic tires for proper inflation.
- ☐ Check power center mount front riggings for worn/frayed belts and/or loose fasteners. If found, replace these items.
- ☐ Check that all labels are present and legible. Replace if necessary.

### **Inspect/Adjust Weekly**

#### **CAUTION**

**As with any vehicle, the wheels and tires should be checked periodically for cracks and wear, and should be replaced.**

- ☐ Inspect wheel/fork assembly for proper tension by spinning caster; caster should come to a gradual stop.
- ☐ Make sure all caster/wheel/fork/headtube fasteners are secure and not damaged/missing.
- ☐ Inspect tires for flat spots and wear.
- ☐ Check pneumatic tires for proper inflation.

### **Inspect/Adjust Monthly**

- ☐ Make sure axle nut and wheel mounting nuts are secure on drive wheels.
- ☐ Ensure that casters are free of debris.
- ☐ Loosen/tighten caster locknut if wheel wobbles noticeably or binds to a stop.
- ☐ Make sure wheel locks DO NOT interfere with tires when rolling.
- ☐ Make sure wheel lock pivot point are free of wear and looseness.
- ☐ Inspect seat positioning strap for any signs of wear. Ensure buckle latches. Verify hardware that attaches strap to frame is secure and undamaged. Replace if necessary.

### **Inspect/Adjust Periodically**

- ☐ Make sure wheelchair rolls straight (no excessive drag or pull to one side).
- ☐ Inspect all fasteners.
- ☐ Make sure clothing guards are secure.
- ☐ Make sure arms are secure but easy to release and adjustment levers engage properly.
- ☐ Make sure adjustable height arms operate and lock securely.
- ☐ Make sure upholstery has no rips.
- ☐ Make sure armrest pad sits flush against arm tube.
- ☐ Inspect wheel/fork assembly for proper tension by spinning caster; caster should come to a gradual stop.

- ☐ Make sure wheel locks are easy to engage.
- ☐ Ensure that casters are free of debris.
- ☐ Check power center mount front riggings for worn/frayed belts and/or loose fasteners. If found, replace these items.
- ☐ Check that all labels are present and legible. Replace if necessary.
- ☐ Inspect electrical components for signs of corrosion. Replace if corroded or damaged.

### **Inspect/Adjust Every 18 Months**

- ☐ Replace motor brushes and gearbox coupling (4 pole).

## **Additional Requirements for Wheelchairs with Powered Seating Systems**

### **Inspect/Adjust Initially**

- ☐ Make sure all electrical connections are secure.
- ☐ Check that cables are routed and secured properly to ensure that cables DO NOT become entangled and damaged during normal operation of seating system.
- ☐ Check limit switch position.
- ☐ Make sure drive lock-out operates properly.
- ☐ Make sure tilt operates smoothly and properly.
- ☐ Make sure tilt mechanism and tilt tracks are clean.
- ☐ Make sure recline operates smoothly and properly (2G Tarsys Only).
- ☐ Make sure elevate operates smoothly and properly (Elevating Seat Only).
- ☐ Make sure elevate systems drive with reduced speed when seat is in elevated position (Elevating Seat Only).
- ☐ Check that spreader bar mounting fasteners are tight (2G Tarsys Only).
- ☐ Check that back cane mounting fasteners and back mounting fasteners are tight (2G Tarsys Only).

### **Inspect/Adjust Weekly**

- ☐ Make sure all electrical connections are secure.
- ☐ Check that cables are routed and secured properly to ensure that cables do NOT become entangled and damaged during normal operation of seating system.

### **Inspect/Adjust Monthly**

- ☐ Make sure drive lock-out operates properly.
- ☐ Make sure tilt operates smoothly and properly.
- ☐ Make sure recline operates smoothly and properly (2G Tarsys Only).
- ☐ Make sure elevate operates smoothly and properly (Elevating Seat Only).

- ☐ Make sure elevate systems drive with reduced speed when seat is in elevated position (Elevating Seat Only).
- ☐ Check that spreader bar mounting fasteners are tight (2G Tarsys Only).
- ☐ Check that back cane mounting fasteners and back mounting fasteners are tight (2G Tarsys Only).

**Inspect/Adjust Periodically**

- ☐ Check that spreader bar mounting fasteners are tight (2G Tarsys Only).
- ☐ Make sure tilt mechanism and tilt tracks are clean.
- ☐ Check limit switch position.
- ☐ Check that back cane mounting fasteners and back mounting fasteners are tight (2G Tarsys Only).

## Troubleshooting - Mechanical

WHEELCHAIR VEERS LEFT/RIGHT	SLUGGISH TURN/ PERFORMANCE	CASTERS FLUTTER	SQUEAKS AND RATTLES	LOOSENESS IN WHEELCHAIR	WHEELCHAIR 3 WHEELS	SOLUTIONS
X	X	X		X	X	If pneumatic, check tires for correct and equal pressure.
X	X	X	X			Check for loose stem nuts/bolts.
X		X				Check that casters contact ground at the same time.

## Troubleshooting - Electrical

*NOTE: For additional troubleshooting information and explanation of error codes, refer to the individual Electronics Manual supplied with each wheelchair.*

### All Wheelchairs

SYMPTOM	PROBABLE CAUSE	SOLUTIONS
Batteries draw excessive current when charging.	Battery failure.	Check batteries for shorted cell. Replace if necessary (Refer to <u>Replacing Batteries</u> on page 101).
	Electrical malfunction.	Contact Dealer/Invacare for Service.
Battery indicator flashes the charge level is low— immediately after recharge.	Battery failure.	Check batteries for shorted cell. Replace if necessary (Refer to <u>Replacing Batteries</u> on page 101).
	Malfunctioning battery charger.	Contact Dealer/Invacare for Service.
	Electrical malfunction.	Poor connections between charger/ wheelchair. Contact Dealer/Invacare.
Battery indicator flashes the charge level is low—too soon after being recharged.	Batteries not charged.	Have charger checked.
	Weak batteries.	Replace batteries if necessary.  Contact Dealer/Invacare for Service.
Motor “chatters” or runs irregular.	Electrical malfunction.	Contact Dealer/Invacare for Service.
Only one drive wheel turns.	Electrical malfunction.	Contact Dealer/Invacare for Service.
	One motor lock is disengaged.	Engage motor lock (Refer to <u>Disengaging/Engaging Motor Lock Levers</u> on page 109).